

AN ATTEMPT TO RATIFY THE CONSTRUCT  
of  
EXTRAVERSION-INTROVERSION THROUGH A TEST OF TYPE-ATTITUDE  
PREFERENCE, AND ON THE TEST CRITERIA  
of  
VERBAL AND NUMERICAL ABILITIES

(The dissertation submitted for the partial  
fulfilment of a course in Research Methodology)

by  
SHYAM SUNDER MISRA

Department of Psychological Foundations  
NATIONAL INSTITUTE OF EDUCATION,  
N C E R T  
1985.



The present work is dedicated with a  
profound respect and sense of love

To

Dr. Shib K. Mitra

whose wisdom, intellect and personality  
have impressed me so greatly as  
he appears me now an envied  
"ego-ideal".



## CONTENTS

	Page
Preface	
I. Introduction	1 - 11
II. The Problem & Theoretical Setting	12 - 18
III. Plan of Study and Methodology	19 - 27
IV. Analysis and Interpretation of Data	28 - 36
V. Conclusions	37 - 41
Summary	42 - 45
Bibliography	46 - 48
Appendix	



## P r o f a c e

The principles of psychology are day by day increasingly applied in various fields of human life. Education as technology is itself mainly built on the foundations of psychological theory. However, both psychology and pedagogy are mutually interdependent since it is yet to be investigated whether psychological phenomena are vicariously affected by training and experience and, on the other hand, how far wisdom of psychology might be serviceable towards more and more perfection of instructional methods. Hence, if we need to built up a fine multi-stories temple of education we must realise, most evidently, that it can only be structured on deep and strong foundations of psychological theory. It is notable that the educational methods and techniques are, now-a-days, most prominently focussing their interest on the consideration of the overt and covert individual differences. As such, the present study is basically devoted to a controversial theoretical issue of individual differences.

The burning problem before pedagogy is to change the raw individuals of flesh and bone into responsible human beings. However, it can be proved incompetent on the matters of biological equipments received by an individual through the process of heredity. Nevertheless, the success of pedagogy depends in channelling its procedures and mobilising its techniques for the noble cause of human development, which is dependent, in turn, on the knowledge and understanding of adjustmental processes in various situations.



of life. The job becomes too easy if it is confirmed that the most of the human development is nothing but the very plain adjustment with the environmental forces working on the human organism.

The writer of this dissertation is highly indebted to Dr. N.N. Sen, Reader in Psychology, for his able guidance and supervision in this study. He expresses his gratitudes to Mr. R.K. Mathur for his keen interest in the problem and for the statistical guidance, and to Mr. S.L. Gajwani for his time to time suggestions and guidance. The writer is much thankful to Dr. Harold Webster, Dr. A.B.L. Srivastava and Mrs. S. Shukla for their keen criticisms and suggestions at the time of project conference which led the present form of the study. He is really grateful to the Principal, Miltan D.A.V. Jr. Sec. School, West Patel Nagar, who very kindly allowed the investigator to have the experimentation in his institution, and to all teachers and students of the aforesaid school who cooperated respectively as invigilators and subjects.

Delhi :  
May 6, 1965.

Shyam S. Misra



## CHAPTER I

### INTRODUCTION

---

From very beginning of humanity, the God given potentiality of differentiation led the thinking personages towards the discovery of "individual differences." The primitive man saw supernatural powers in abnormal phenomena of life like illusion, delusion, hallucination, hysterical and paranoid characteristics and exceptional physical and mental potentialities. The Indian concept of God's incarnation to an epoch making human individual can be exemplified as the rational adaptation in the field of philosophy and religion. However, in every civilisation of the world exceptional persons equipped with tremendous energy or one or more specific high socially approved personality attributes and potentialities were regarded either Angels, sons of God, Prophets or unique product of noble heredity, lucky persons by chance, and the effective boon blessed by the noble deeds of previous lives.

The explicit recognition of individual differences, as the earliest instance, can be found in the writings of Plato (1, p. 60). In his opinion every individual is born different to others in his natural endowments and as such is capable for only specific types of occupations. Aristotle (2) also attributed such differences, however partially, to the innate factors.

\*\*\*\*\*

1. J.L. Davies and D.J. Vaughan, (Transl.), The Republic of Plato. New York: Burt, 19 --.
2. W.D. Ross, (Ed.), The works of Aristotle, Vol. Ix, Oxford: Clarendon Press, 1916.



Among modern thinkers, Bain (3) gave some attention to individual difference in his writings. According to him, "there is a natural force of adhesiveness, specific to each constitution, and distinguishing one individual from another." (p. 237). He considers this property to be unequally distributed. On his empirical findings of inferior sensitivity among idiots, Galton (4, p. 29) concluded that sensory discriminative capacity would, on the whole, be highest among the intellectually ablest.

Stern (5), as a psychologist, published his most systematic treatise in which the problem, nature and methods of differential psychology have been dealt with. Differences between individuals, racial and cultural groups, occupational and social levels and sexes were discussed. The problem has been attributed threefold: (a) nature and extent of differences in the psychological life of individuals and groups; (b) factors determining or affecting these differences; and (c) manifestation of differences. Heredity, climate, social and cultural levels, training, adaptations etc. were attributed to the development of individual differences. He also suggested ways of measuring such differences by means of introspective reports, objective observation, creative products, biography, cultural studies, quantitative testing and experiment.

— — — — —  
3. A. Bain, The Senses and the Intellect. London: Parker, 1855.  
4. F. Galton, Inquiries into human faculty and its development. London: Macmillan, 1883.  
5. W. Stern, Über Psychologie der individuellen ... Differenzen. Leipzig : Barth, 1900.



The empirical psychology of the present century took this problem very enthusiastically. The application of psychological principles has been made in various practical fields of human affairs which enhances interests of many people toward individual differences and attracted to endeavour with creative ability and contributions in this field. The major objectives of differential psychology have been put as follows:

"What is the nature and extent of such differences? What can be discovered as to their causes? How are the differences affected by training, growth, physical conditions? In what manner are the differences in various traits related to one another, or organized?" (6, p.4)

However, none of the above questions are yet solved nor there seems any trend in the proper direction to solve such theoretical issues. The so called applied psychologists are satisfied with their trivial success in their respective fields and are least worried about the theoretical issues which, perhaps in their opinion, are solvable by the majority votes of so called investigations. Webster (7, p.1-2) seems to be a victim of this effect in his controversial statement about a need to improve education, perhaps, without any need of understanding the educational process. The host of psychological literature and tremendous number of investigations - which are coming due to plenty of funds in the hands of immature minds having least aptitude in research, having deep rooted behaviourism in their minds, being

- - - - -

6. A. Anastasi, & J.P. Foley. Differential Psychology. New York : The Macmillan Co. 1956.
7. H. Webster, Planning Educational research, (Unpublished).



keen observer only for "stimulus" and "response", restricting themselves to the problem of "existence" and "non-existence" of something or other, having their own unique concept of "psychology" - are creating an unsolvable controversy and an awkward situation toward the operations of the proper task and intellectual prestige for a few sincere, honest and insightful workers in the field.

Understanding, prediction and control are called the main objectives of science (8, p. 99), and "the sole purpose of science is to understand the world in which man lives." (9, p.7). If this is so, these things are possible to achieve only by the means of knowledge about some fundamental laws of the phenomena concerned. I do not think a science is possible merely on the basis of facts omitting the significance of laws and theory at all.

Every science is assuming the lawfulness of nature : "we assume that the closer two events in time, space, and measured value on any or all dimensions, the more they tend to follow the same laws." (10, p. 187). "Without laws or generalisation, no explanation is possible. The mere accumulation of individual facts bring no explanation, hence neither understanding nor control." (11, p.56). Since a science is only possible on the assumption of the lawfulness of nature the doctrine of individual differences - so far as its biological emphasis and emphasis on distinctive individual processes are concerned - seems contradictory

-----

8. N.L. Gage, Handbook of Research on teaching, Chicago: Rand McNally and Co., 1963.
9. W.J. Goode, & P.K. Hatt, Methods in Social Research, New York: McGraw Hill Book Co., Inc., 1952.
10. D.L. Campbell, & J.C. Stanley, Experimental and Quasi-Experimental Designs for Research on Teaching, In N.L. Gage's (Ed.) Handbook of Research on Teaching, Chicago: Rand McNally & Co., 1963.
11. May Brodbeck, Logic and Scientific Method in Research on Teaching, p.44-65, In N.L. Gage's (Ed.) Handbook of Research on teaching.



in itself to become a science. It is ridiculous to see that, on the one hand, psychology believes on adjustment and maladjustment, fixation and conditioning, as the main forces in the construction of personality, on the other hand, ignoring altogether any lawfulness of nature, it has faiths in innate individual differences in the psychological process.

The doctrines of "individual differences" may be categorized under three main heads :

- (1) Those pleading for innate differences in processes and biological differences in normally born persons,
- (2) Those emphasizing the different organisations of the processes in different persons,
- (3) Those assuming adaptations in environmental situations.

If we treat first category to be true, different psychology is needed for different individuals and generalization and law derivation is not possible due to millions of noticeable differences with those persons. Although it is true that different persons have different heredity i.e. biological equipments, the fundamental processes might have been the same for the development and evolution of the tiny drops of organic secretions into human beings. The whole humanity has come, probably from a common parenthood. If we assume no inheritance of acquired characteristics then how would possible there be any significant difference among offsprings of the same parentage. Conversely, if we assume inheritance of acquired characteristics, any emphasis on innate biological and psychological equipments is misleading and absurd since these are modifiable in the course of development and evolution. Moreover, even if the idea of a common parenthood is not accepted there must not be much individual differences since the host of beings who evolved as first humans on this earth



might have not been so different from each other as we see today the human beings are. It is noticeable that the primitive men still do not differ so much among themselves as the people we usually find in highly complicated social structures of the modern world.

Another doctrine under this head, popular in Soviet Russia relying on the studies by Pavlov on dogs, is concerned with the type of nervous system which lead to different personality patterns in different people (see 12). Williams (13) also reported biochemical, anatomical and physiological differences between individuals. However, it is not known how far these differences cause the differences in behavioural patterns and whether or not these biological differences have occurred due to different manners in utilization of different organs by different individuals. As it is known that continuous exercise may change the muscles of the body, some deep emotional occurrences may disturb the whole system both functionally and anatomically, it might be possible that the repeated stimulation from the similar kind of situations and the similar type of reactive responses have caused changes in the nervous tissues and as such individual differences in physiological mechanisms are distinguished.

Another view, in this respect, argues that since there are individual differences in strength, mobility and balance (see 12, p.26) of nervous system type-theory can be based on these lines. Such characteristics are given by heredity and/or under the control of the endocrine glands(14,p.40).  
- \* - - - -

12. B.M. Teplov, Typological Properties of the Nervous System and their Psychological Manifestations, p.21-51, In N.O'Connor's (Ed.), Recent Soviet Psychology, Oxford: Pergamon Press, 1961.
13. R.J. Williams, Biochemical individuality: the basis for the genetotrophic concept, New York: Wiley, 1956.
14. D.M. Johnson, Psychology: a problem-solving approach, New York: Harper & Bros, 1961.



It is not known whether the extreme cases of such differences remain fixed in that extreme throughout the whole life or have periodic changes; whether they are fixed in that extreme for all of their behaviour or react in the other extreme for some specific behaviours; whether this is the natural way of their adjustment or such persons are maladjusted. We cannot declare significant differences in processes and mechanisms on the basis of overt behaviour. Nearly the same behaviour might appear in different individuals but the underlying processes for elucidation of such a behaviour might be quite different. Moreover, if each of these factors (strength, mobility, balance etc.) are a single dimension these must be distributed normally among the people in which a small percentage will go to extremes. However, these extreme cases are not controversial to the main factor being themselves the part of it and as such this does not create any dichotomy or multipartite. Rather to call different extremes of a single continuous factor by the name of different factors is erroneous.

The second category of organisations of processes is supported both by Soviet psychologists (see 12, p.26) and Westerners. Pavlov understood types of nervous activity as "different combinations of the basic properties of the nervous system" (16, p. 267) Western psychologists found individual differences in higher functions while in simple fundamental processes differences are least significant (15, p. 99-100). For Anastasi (17, p. 25) "differences among people are a matter of degree".

====

15. F.S. Freeman, Theory and practice of psychological testing. New York: Holt, Rinehart & Winston, Inc., 1960.
16. I.P. Pavlov, (1951-52) Poln. Sbbr. Soch (Complete Works) III, Bk 2.
17. A. Anastasi, Differential psychology. New York: Macmillan Co., 1958.

11

1

These views seem futile on the considerations we have already made above. Such organizations of simple fundamental properties or processes cannot be treated the root cause of typology. Combination of basic processes into different organizations occurs differently not only in different persons but differently in the same given person on various occasions. On such a basis crude and initial discrimination of human beings is misleading and harmful. However, as a student of psychology our basic interest should be in knowing such fundamental properties or processes and the manner in which they become organized.

The thoughts of third category do not come under the real concept of "individual differences". Adjustment in the environment depends on some basic laws, subjective perception or psychological field, and the kind and intensity of stimulus situations. Since situations are generally different and a single situation might be different for different persons or different for the same person at different occasions, the differential behaviour is but natural. Maintenance of any concept of "individual differences" on the basis of such a differential behaviour is not justified. Rather this problem area should be the chief centre of attack for the maintenance of general psychology as a science. It is in the course of time that habit and conditioning give adaptations to some specific type of responses in specific type of situations and as such differences in behavioural patterns are noticeable for different individuals.

The methods of investigation for the individual differences have been relying mostly on the standardized examinations (so called mental tests) with emphasis on generalization and statistical manipulation. Basing on the theory of sampling (in contrast to physical sciences where any part of a specific material content is regarded as the representative



of its whole population) one person is not regarded the representative for the whole humanity; this system, perhaps, does not seem to believe on the basic laws, processes and theory of human behaviour. Hence this system is searching the black cat in the dark-room without any a priori basis for investigation and research.

Application of psychology in various fields of life has been done without a full knowledge of fundamental characteristics of human nature and development. In fact, application is also necessary being another methods of scientific investigation and discovery. The task of basic researches is to investigate into the fundamental properties or processes but the applied researchers are solely responsible to see whether such findings are exact, workable and generalizable. As we see, applied physical sciences and technologies have stood on the base of physical sciences like physics and chemistry; medicine is based on physiology, biochemistry etc. But applied psychology wish to establish caring least for general psychological principles. This is the main reason the applied psychologists are searching in the dark and satisfying themselves on futile success by means of generalizations on the basis of sampling theory. The early experimental psychologists were known to their responsibilities of establishing psychology as exact science. They either ignored individual differences or accepted them as a necessary evil for the scientific cause (18, p.6). Their main interest remained with the fundamental processes and as such in the topics of related fields also determining those processes like physiology. They studied the problems of sensation, psychophysical relationships and the working of nervous



system. "Wundt's hardheaded experimentalism was expressed in perhaps more exaggerated form by Titchener. He not only held that psychology must be experimental; he held that it must also be pure. Applied science seemed to Titchener a contradiction" (19, p. 69). Fortunately, the psychologists from European continent and more specifically from Soviet Russia have kept in themselves with this tradition. Teplov (20) gives his views, in connection to the scientific policy for the study of individual differences, as follows:

"Successes in the study of individual psychological differences depend to a considerable degree on the development of general psychological theory, and above all, of course, on the development of general problems in the psychology of personality, but they will also depend on the creation of a system of psychology which will eliminate the gap which now exists between the two parts of this science, namely the psychology of psychic processes and the psychology of personality (p.22)". "Our task is to find means for analysis of the properties of the 'soil' and to demonstrate how these properties affect the 'growth of the plant'. This cannot be replaced by a description of the flora of the area and classification of the vegetational landscapes" (p.33)

Up to this time the writer has dealt with the problem of "individual differences" in broad fields which also covers the problem of introversion-extraversion as one specific. However, this problem is due to be

\*\*\*

19. M.H. Marx, and W.A. Millix, Systems and theories in psychology. New York : McGraw-Hill Book Co., Inc., 1965.
20. B.M. Teplov, Typological Properties of the Nervous System and Their Psychological Manifestations. In O'Connors' Recent Soviet psychology. Oxford: Pergamon Press, 1961.



discussed in the next chapter when the writer will deal with the problem of investigation.



## THE PROBLEM AND THEORETICAL SETTING

---

The recognition of "individual differences" is not new but this becomes meaningful when some significance is attached to it. Since uncommon cases are easy to comprehend in the society, specific meanings are attached to such uncommon events, persons or attributes by way of making proverbs and phrases; also generalizations are made on the basis of subjective observations by the fellowmen. The scientists also could not keep themselves aloof from this lustre of predicting personality attributes on the basis of some common or uncommon bodily or behavioural characteristics. Like many other proponents of typology Jung (1) also advocated a possibility of two basic attitudes in the psychological behaviour of human individuals. In his view when ego has an attitude to face the outer world it is extraverted; when it has an attitude to face the inner world it is introverted (2, p.57). These two attitudes are strikingly in contrast to each other, however, both attitudes are present in a normal person. The type-attitude clearly predominates; superior functions are determined by the type-attitude while inferior functions remain in the service of the opposite one. (1, p.426)

~~~~~

1. C.G. Jung, Psychological types, London : Routledge & Kegan Paul, 1923.
2. Michael Fordham, New developments in analytical psychology, London : Routledge & Kegan Paul, 1957.



Just after the publication of Jung's book in 1923, the psychologists all over the world began to use his terminology; the concept of extraversion-introversion has been extended to many directions linking with physiological processes and morphology, with perceptual and cognitive behaviour, with socio-cultural phenomena and with physical and psychopathological disorders. Some personologists, particularly in America, became engaged in devising paper and pencil tests for the quantitative measurement of these tendencies. The term was defined and redefined and various theoretical explanations were made by psychologists like Conklin, Freud, McDougall, White, Tansley, Bingham, Murray, Eysenck etc.

The early attempts to demonstrate these relationships became futile and the investigators began to doubt the validity of the construct. It was found that introversion questionnaires essentially measured the same attribute which were measured under the head of "neuroticism" (3). The factorial studies of these questionnaires revealed a general factor corresponding "a genuine maladjusted-psychoneurotic-introverted tendency" (4). However, this faulty relationship became prevalent, perhaps as Cellier and Ench (5) indicated, due to the fact that most of the questionnaire constructors

-----

3. R.G. Bernreuter. The Fabrication of Tests of Introversion-Extraversion and Neurotic Tendency. J. Soc. Psychol., 1934, 5, 184-201
4. P.H. Vernon. The assessment of psychological qualities by verbal methods. London: H.M. Stationery Office, 1938.
5. R. Cellier and M. Ench. Introversion-Extraversion: The Concepts and Their Clinical Use. Amer. J. Psychiat., 1938, 94, 1045-75



used Freudian (6) concept of introversion and, also, since extraversion and sociability were completely identified with each other. (7, p.52-55). Another doubt arised about the unidimensionality of extraversion - introversion since correlations between various measures of the so-called dimensions were found very low. Murray (8) states:

"Ten years work and reflection have led me to the conclusion... .... that Jung has suberved under the term 'extraversion and under the term 'introversion' a number of variables which are not always correlated .... . In short, as other have concluded, it seems that extraversion and introversion are not unitary variables" (p. 238-239)". We should suggest that if extraversion and introversion are used as variables they should be treated separately, not considered to form a single continuum" (p.242).

Cattell (9) insisted that extraversion-introversion was nothing more than a broad cluster of related trait elements and as such not a very useful construct. He became very extremist when he suggested that

"It is perhaps worthwhile to make a determined attempt to rescue the label 'extravert-vs-introvert' from the scientific disrepute and uselessness into which it has fallen through popular adoption."

- - - - -

6. Sigmund Freud. General introduction to psycho-analysis, New York Liveright, 1920.
7. H.J. Eysenck, Dimensions of personality, London, Routledge and Kegan Paul, 1947.
8. H.A. Murray. Explorations in personality, New York: Oxford University Press, 1958.
9. R.B. Cattell. Personality and motivation structure and measurement, Yonkers, N.Y.: World Book, 1957.



Nevertheless, in a review of factorial studies, Eysenck (10) observed that although "the picture is not as clear as one might wish..... its main outlines are becoming more and more definite." He supported the position of unidimensionality of the construct. In opposition to Cattell's (9) view of the environmental origin of extraversion-introversion, Eysenck (11) opines that the heredity plays the major role. A recent reviewer (12) after discussing the results of factorial studies of extraversion-introversion published since the time of previous review by Eysenck in 1953, concludes:

"The present review was prompted by the recent burgeoning of interest in extraversion-introversion, and by the fact that current assumptions about the unidimensionality of the construct, and its independence for adjustment, cannot be justified in terms of the research covered by the last comprehensive review. An examination of more recent research has shown the evidence on both issues to be equivocal, and the status of extraversion-introversion as a dimension of personality thus remains somewhat tenuous." (p.557).

The present writer does not want to go into the controversy of the origin of extraversion-introversion as hereditary or environmental factor. He has already expressed his view in the previous chapter on this matter. However, the writer thinks the construct of

- - - - -

10. H.J. Eysenck. The structure of human personality, London: Methuen, 1953.
11. H.J. Eysenck. The Inheritance of Extraversion-Introversion. Acta Psychol. Amsterdam, 1956, 12, 95-100.
12. P.M. Carrigan. Extraversion-Introversion as a Dimension of Personality: A Reappraisal. Psychol. Bull., 1960, 57, 529-550.



extraversion-introversion as one of the most important constructs, since this seems to him the organization of basic properties or processes of psyche. The writer is certainly interested to know the conditions under which such an organization takes place with its significance as motivational strength for the manifestation of requisite behavioural patterns. He is interested to know how far this helps in the adjustment to the environmental conditions and in the adaptations in various fields of human affairs. To his interest is the problem that whether these two traits of extraversion and introversion belong to the two opposite extremes of the distribution of an unitary function or this is within the capacity of certain people to face outer world as well as inner by the same vital force channelising in the required direction according to the conditions thereon. In other words, if it is continuously found on an appropriate scale of extraversion-introversion that majority of people fall in the middle way - i.e. as both extraverted and introverted - there seems no dichotomy as such and Jung's view that one type-attitude clearly predominates is refuted. The frequency distribution of such observations must be bimodal. The high frequencies at the middle of an unimodal normal distribution shall indicate that the same vital force might be directed both way to adjust with the outer as well as inner world. Moreover, if there is a fixation of ego to be so prompt either with the outer or inner world we should go into the proper enquiry of the characteristic behaviours eventually occurring due to such a fixation. These characteristic criteria were put forth by Jung (13, p. 412 - 517) and were editively summarized by



Murray (14, p.232-244).

Since it is described that the introverted is basically of imaginative nature and thinking type keen in having insight in planning and in presenting novel ideas and theories, it has been hypothesized that these attributes should be highly correlated with the capacity to reason and problem solving. As such, numerical reasoning has been decided a better criterion for the manifestation of introverted tendencies. Also, since extraverted has been described as the person with powers of good expression and sociability and keen on taking advantages in social affairs it is assumed that he must have been richer in his language endowments. Therefore, verbal ability has been selected as the most suitable criterion for extroversion.

Most of questionnaires prepared for extroversion-introversion are either "true-false" or "yes-no" type. This might have been the main cause of discrepancies, contrary to our assumptions, among distribution of scores on these two dimensions, since the subjects had every liberty in these questionnaires to check items, however, qualifying their inferior functions which are theoretically regarded to be dominated by the opposite type-attitude. Nevertheless, if with the provision of selecting the preferential type-attitude among the two statements in a parallel-item extraversion-introversion scale leads to the same results of unimodal normal distribution with majority of cases in the middle the idea of type-attitude is almost shaken.

In view of the above discussion the problem formulated for investigation can be specified as "an attempt to ratify the construct

14. H.A, Murray. Explorations in personality. New York: Oxford University Press; 1938.



of extraversion-introversion through a test of type-attitude preference, and on the test criteria of verbal and numerical abilities."  
Evidently, two hypotheses may tentatively be framed for testing:

First, if either of the two type-attitudes clearly predominates on the given opportunity to check on a parallel-item extraversion-introversion scale then there appears every possibility of a bimodal frequency distribution of scores. Conversely, if the scores are such distributed so that majority of subjects fall in the mid-scores the idea of clear predominance of either type-attitude seems futile and the construct of extraversion-introversion as such seems repudiated.

Second, notwithstanding the first, if extraversion and introversion are significantly distinguished respectively on the test criterion of verbal and numerical ability then the underlying dispositions seem undoubtable. In other words, if the extravertive and introvertive tendencies seem equally correlated on both criteria or seem uncorrelated with their respective criteria the underlying dispositions are doced and the construct is obscure.



## CHAPTER III

### PLAN OF STUDY

### AND METHODOLOGY

---

The necessary prerequisite for planning a research study on the problem discussed in the previous chapter is to know in clear terms what we do want to find out. For this the main interrogation marks can be presented as the following: Does there seem any authenticity in the construct of extraversion-introversion, as such defined by Jung (1), to be a real psychological propensity? Does, actually, either of the two tendencies clearly predominates as a behavioural disposition in every individual? Whether these two tendencies can be put on a continuous scale and distribution or seem quite independent and exclusive entities? Do they seem contrary to each other so that presence of one is restricting the presence of other for some specific functionalism? How far extraversion and introversion are positively correlated to the verbal ability and numerical reasoning respectively? Does there appear any significant differences in the test scores of verbal ability or numerical reasoning for the subjects categorized as extraverted or introverted?

In the process of gathering valid evidences to answer the above questions the following steps have been taken:

#### Selection of subjects

For each step it seemed inevitable to control or at least minimise the effect of extraneous variables. Since, apart from

1. C.G. Jung, Psychological types, London : Routledge and Kegan Paul, 1923.



the effect of extraversion-introversion on the scores of numerical reasoning and verbal ability, other variables like specialized training, school factor, grade, sex, etc. might significantly influence the subjects' performances it seemed necessary to control such factors. With this idea in mind the students of class IX only from one boy's school in Delhi were selected as the sample. In all, only eighty students of Milltan D.A.V. Higher Secondary School, West Patal Nagar could take part as subjects in all the tests which were administered on them. Since the tests were administered in the end of the academic session and just before the final examinations only a part of students *were attending the school. Out of 160 students* on roll in class IX only 104 were present in the first session of test administration and 110 in the second session but only 80 students could take all the tests. Of three sections of class IX section A consists of Arts students and section B and C having the Science students. Thirty Arts students from section A and twenty-eight plus twenty-two students from science side, respectively taken from section B and C, were consisting our sample of eighty students.

#### Selection of tools

We were in need of those tools which could measure quantitatively the verbal ability, numerical reasoning and extraversive-introversive tendencies in consideration with the age and grade of the subjects. For the measurement of verbal ability tests of word relationship (Sambandha-Nirdharana Parikshana), and word meaning (Shabdartha Jnyana Parikshana), prepared by the Department of Psychological Foundations, National Institute of Education, Delhi,



were selected for our purpose. The Sambandha-Nir�harana Parikshana is a forty-item verbal analogy test in Hindi in which emphasis has been made on both vocabulary and its proper use as well as on the exact word relationships. In other words this test may be called a test of word-fluency. The subject has to fill-up the blank in exact relationship, as exemplified in the sentence, with a given word. Four types of sentences are presented differing in the placing of blanks in every possibility. The Shabdartha Jnyana Parikshana consists of fifty items each with five choices to select the appropriate meaning of the given word. The distractors are chosen as near in the meaning and sense to the given word as possible. This test is purely a test of vocabulary.

Since none of the two tests has been standardized, validated and made reliable these tests were simply regarded as objective examinations inclined to measure the abilities, as described above in concern to each of them. To measure the numerical abilities and the extent of extraversion-introversion no test in Hindi, suitable for class IX, has been found. Therefore, an attempt was made to prepare these tests.

#### Construction of Tools

Preparation of extraversion-introversion scale has been started with a comprehensive study of the description of criteria. (Ibid., p. 412-517). A hundred item questionnaire inclusive of nearly all the criteria given by Jung has been prepared. Each item contains two statements of opposite nature suiting



extraversive and introversive tendencies and representing all broad categories of thinking, feeling, sensation and intuition on both conscious and unconscious attitudes. All hundred items were discussed with Dr. N.N. Sen and alterations were made where found necessary. Finally, thirty items were found suitable considering the factors of age, sex, language, and psychological development of the subjects and therefore selected for our purpose. The number of items were restricted to thirty also considering the time to be given for the test. The instructions for this self-rating questionnaire were to check that statement in each item which aptly applies in case of the subject taking the test.

As stated in the previous chapter, the investigator has merely been interested in presenting two parallel situations (here statements) qualifying respectively extravertive and introvertive tendencies for preferential selectivity by the subject. Since these criteria have been adopted from Jung and since our main purpose is to ratify these criteria any procedure in test construction like item-analysis, standardization, validity and reliability has not been thought necessary to work out. These items were just regarded as stimulus variables in any experimental situation for inducement of certain specific sets of response.

The second test which has been prepared is a test of "mathematical ability as related to reasoning and use of symbols". This has been constructed with the idea of inducing thinking and problem solving attributes of the mind. In all, nearly forty items were constructed.



out of which only twenty were retained, finally, considering the length of test in respect of time and fatigue factors. Each set of the elements, for which descriptions are made as below, consisted of nearly three items in the tests:

1. Number Series is a free-answer test in which missing term in the series is to be supplied. Sample item:

Complete the series by replacing the asterisks by appropriate numbers :

3, 2, 6, 4, 9, 6, 12, 8, 15, \*, \*.

2. Statement to Symbol Translation consists of items in which the problem is to choose from four given alternatives, the one that correctly translates the verbal statements into an algebraic expression.

Sample item:

The oranges are sold a paiza and bananas b paiza per piece. If somebody pays c paiza for 2 oranges and 5 bananas which of the following equation will be satisfied:

A.  $2a + 5b = c$

B.  $3a + 2b = c$

C.  $5ab = c$

D.  $6ab = c$

3. Oddities is essentially a series type test. Sample item:

122  $\times p = 108$

125  $\times p = 1107$

1234  $\times p = 11108$

12345  $\times p = 111105$

Now complete \_\_\_\_\_  $\times$  \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



4. Missing Number is a simple number-operation test. The test item is an incomplete solution which is to be completed by applying the missing numbers. Sample item:

Replace the asterisks by numbers considering the logical significance of the solution:

$$\begin{array}{r} * 3 8 \\ 5 * 7 \\ \hline 6 5 * 2 \\ 5 * 1 6 \\ 2 8 * * \\ \hline * * 3 * 1 2 \end{array}$$

5. Missing Sign is a companion test to missing number. The task is to supply the mathematical sign that will make an incomplete equation true. Sample item:

Replace the asterisks by the appropriate mathematical sign :

$$\frac{p * q}{\frac{p}{q}} + \frac{x * z}{\frac{x}{z}} = 1 + a^2$$

6. Simple problems for computation in which computational skill and reasoning are involved. Sample item:

Calculate the average square root of the following numbers upto two decimal places :

9, 11, 20, 56, 51, 49, 25, 16, 14, 18,

Answer \_\_\_\_\_



7. Use of formulae in which the appropriate formula is to be selected, out of five given choices, as required for the solution of a given problem. Sample item:

Which of the following formulae would be useful in simplifying  $\frac{(2.30)^2 - (1.20)^2}{2}$

- A.  $(a+b)^2 + (a-b)^2 = 2a^2 + 2b^2$
- B.  $(a+b)^2 - (a-b)^2 = 4ab$
- C.  $(a+b)(a-b) = a^2 - b^2$
- D.  $(a+b)^2 = a^2 + b^2 + 2ab$
- E.  $(a-b)^2 = a^2 + b^2 - 2ab$

Answer \_\_\_\_\_

This test has also been used as a simple objective examination. The main purpose has been to have a rough estimate of mathematical ability, seeing the limitations of time and facilities. It is notable that in all of the items the influence of courses taught according to syllabus is eliminated as far as possible. Such stimulus situations are presented which require thinking, reasoning and problem solving capacity successfully to deal with. Rather subjects are enforced to think and find out a solution out of their own mind. Moreover, the prerequisite of mathematical knowledge and its application as such has been minimized to its best.

#### Administration of Tests

The tests of extraversion-introversion and mathematical ability were administered in one session while the tests of word



relationships and word meaning were administered in another session with a gap of nearly one week. These tests were given in the usual classrooms duly invigilated by the respective teachers assigned to those classes in the school routine. The tests were administered in the beginning periods to avoid strain, fatigue and disinterest on the part of subjects. No verbal instructions were given to the students except when they felt difficulty, however, sometimes they were introduced a little about the task to be done. The written instructions inclusive of proper examples were provided with each test, excepting the test of mathematical ability where instructions were given without any example of solved problems. This was done to stimulate their own thinking. Exemplification, in this case, would have been rather pulled down the purpose and utility of the test.

#### Scoring Procedures

Separate scores were obtained for both extraversive and introversive tendencies. For checking one item one mark had been allotted and total scores for each subject were obtained for extraversion as well as for intreversion. Since each subject had to check either of the statements pertaining to extraversion and intreversion the correlation coefficient between these two variables remained minus one. A few subjects omitted some items which were later on randomly adjusted by the examiner. The maximum marks for each subject in this test had been thirty, since the test consisted of thirty items.

The test of mathematical ability had twenty items in all. One mark had been allotted for one correct item; maximum marks being twenty. Since some items need answers at more than one place a



credit of one-half mark was given for partly correct solutions. A zero mark had been scored for incorrect or omitted items. Total scores for all twenty items were collected for each subject.

In the scoring of the test of word relationship and word meaning one mark had been allotted for each correct item and zero for incorrect or omitted item. In this way, total marks were separately obtained on both 40-item Sambandha-Nirdharan Parikshana and 50-item Sabdartha Jnyana Parikshana for each individual. The maximum marks in these tests had been respectively forty and fifty.

The remaining discussion about statistical treatment is being postponed for the next chapter which is absolutely reserved for analysis and interpretation of data.



## CHAPTER IV

### ANALYSIS AND INTERPRETATION OF DATA

---

Plan of the study and methods of collecting data have been dealt within the previous chapter. The present chapter is restricted to the statistical treatment of the collected data and the interpretations of results. The statistical techniques are to be sought out in respect of the hypotheses framed in the chapter two.

Since, it has been hypothesized that if the frequency distribution of total scores on a parallel-item extraversion-introversion scale tends toward bimodality, then and only then, it can be said that the construct of extraversion-introversion has some real significance. For this a frequency polygon or a histogram is required to be drawn out. Any of the two graphic representations can easily give an idea about the modal tendency of the distribution. However, sometimes it might be difficult to justify the apparent or obtained modal tendency since chances of error are inevitable. Therefore, it is hypothesized that if, actually, there is a complete dichotomy in these two constructs of extraversion and introversion and, consequently, the frequencies at two significant levels are added, ideally speaking (in terms of expectation), there must be significant difference between the



loadings of extraversion and introversion preferences. Hence, our null hypothesis is

$$H_0 : \mu_{e-i} = 0$$

where,  $\mu_{e-i}$  is the mean of difference between extraversion and introversion scores. Parametric and non-parametric tests of goodness of fit seem much more useful to justify the tendency of observed distribution in terms of normal distribution.

The presentation of stimulus situations (i.e. items in our case) might affect the results. For this, inference about the working of the items should also be known. Do the items actually discriminate between the extraversion and introversion attitudes? Is there an equivalence of the parts (items) in our questionnaire? To explain these things both discriminating indices and internal consistency reliability might be needed. However, it is important to note that these informations on sample statistic, probably, do not intend to satisfy the dubious character of the problem. The experiment is essentially designed to know the distributions of the scores which eventually determine the discriminating indices and internal consistency reliability rather than the opposite is true. In other words, the main drawback in mental testing science has been to make inferences about the attributes of persons on a frame of reference of their own performances.

It has already been indicated in the previous chapters that the items of extraversion and introversion are presented as



simple stimulus situations just like as in an orthodox experiment in which the investigator is interested in observing the reactions of the persons to understand the psychological processes. These stimulus situations might be presented with the help of tachistoscope or by some other device. In such a situation the necessity of test validity and standardization does not reason much to the mind of the writer. Whenever, anything (like, item analysis, validity, reliability, standardization, etc.) is established on the trend of performances being done, it does not seem justified and convincing so far to utilize such established facets again for the interpretations of the same performances in a feedback manner.

In comprehension of the functional relationships of extraversive and introversive tendencies respectively with verbal and mathematical abilities, the product moment correlation coefficient seems a good indicator. However, a possibility of such differences may be expected between the extreme cases. This suggests the investigator to know the standard errors of difference in mean performances of these extreme groups. It does also seem necessary to see, at every step, the significance of obtained statistic.

### RESULTS

The scores for 104 individuals on Extraversion-Introversion scale are indicated in table I (Appendix) along with their



frequency distributions. The mean score value is 14 with a standard deviation of 5.57. An estimate of the standard error of mean by formula  $\sigma_M = \frac{\sigma}{\sqrt{N-1}}$  (see 1, p.185) comes to 0.35 and for standard deviation by formula  $\sigma_S = \frac{\sigma}{\sqrt{2N}}$  (Ibid., p.174) it comes to 0.247.

The standard error of  $U_{0.1}$  calculated by the formula

$$t = \frac{\sum D}{\sqrt{\frac{N \sum D^2 - (\sum D)^2}{N-1}}} \quad (\text{see } 2, \text{ p. 153}).$$

where  $D$  is the difference between extraversion score and introversion score for a single individual and  $N$  is the number of individuals in the sample (104 in our case) - which comes to 2.87. The percentile value of student's  $t$  distribution for  $n-1$  degrees of freedom (103 in our case) indicate this value significant at both 5% and 1% levels. (For  $n=120$  the 1% and 5% values are respectively 2.62 and 1.98, and for  $n=60$  these are 2.66 and 2.00 - see 2, Table IX, p.405).

To test the goodness of fit the expected frequencies for a normal distribution were estimated by obtaining standard scores by formula  $\frac{X - \bar{X}}{\sigma}$ , getting the appropriate ordinates (3, Table II, p44) and deriving expected frequencies by formula  $f_e = \left( \frac{4N}{\pi} \right) y$ , (1, p.122).

1. J.P. Guilford, Fundamental Statistics in psychology and education, New York: McGraw-Hill Book Co., Inc., 1956

2. H.M. Walker, & Joseph Lev. Statistical Inference. New York: Henry Holt and Co., 1952.

5. R.A. Fisher, & F. Yates. Statistical tables for biological, agricultural and medical research. Edinburgh: Oliver and Boyd Ltd., 1963.



The  $\chi^2$  was calculated by formula  $\frac{\sum (f_o - f_e)^2}{f_e}$  which comes to 20.411. The percentile values of the chi-square distribution for 19 degrees of freedom are 32.9 and 38.6 respectively at 5% and 1% levels. The obtained value is insignificant and the  $H_0$  is accepted. (see Appendix Table II).

Another test used for goodness of fit was the Kolmogorov-Smirnov (one sample Non-parametric) Test. The cumulative proportions for expected and observed frequencies were calculated and the absolute differences (D) between the ogives for  $f_e$  and  $f_o$  were obtained (see Appendix Table III). The largest D equals .0255 which is insignificant both at 5% level and 1% level for which values are respectively .133 and .16 being calculated from the formula given in Table E, Siegel (4.p.251).

The item-analysis was performed according to the instructions of Davis (5) with the help of the known preferences of 104 boys for extraversion and introversion statements. The percentage successes on extraversion statements of upper and lower 27% groups, (27 and 28 individuals in the respective group in our sample of 104 students; the upper group consists of those who secured 17 or more marks on extraversion scale and the lower group consists of those who secured 12 or below) indicate the discrimination index on the chart provided by Davis which are presented in the last column of table IV (Appendix).  
- - - - -

4. Sidney Siegel. Nonparametric statistics for the behavioural sciences. New York : McGraw-Hill Book Co., Inc., 1956.
5. F.B. Davis. Item-analysis data: their computation, interpretation and use in test construction. Cambridge, Massachusetts: Graduate School of Education, Harvard University: 1949.



In the upper 27% group a : number of 27 students automatically had come above or on a score of 17, while in the lower 27% group the number of students was completed by random selections of 5 students out of 10 who had a score of 12.

The equivalence of items, for the purpose of seeing "internal consistency" of the test, has been confirmed by the Kuder-Richardson Formula 20 (see 6, p. 380).

$$x_{bb} = \left( \frac{n}{n-1} \right) \left( \frac{\sigma_b^2 - \sum_{i \neq b} \sigma_i^2}{\sigma_b^2} \right)$$

where  $n$  is the number of items in the test (30 in our case),  $p$  is the proportion of responses for introversion and  $q = 1-p$  is the proportion of responses for extraversion. The reliability coefficient comes to 0.52 (see Appendix Table V).

The product-moment correlation coefficients between extraversion scores and scores on the tests of Mathematical Ability, Analogy, and Word Meaning were found respectively .0765, .0656 and .1772; all were found insignificant when these were estimated by the formula.

$$t = \frac{\sqrt{N-2}}{\sqrt{1-\frac{2}{N-2}}} \quad (\text{see 2, p.251})$$

which has a student's distribution with  $N-2$  degrees of freedom, where  $r$  is the correlation coefficient and  $N$  is the number of individuals, ( $t$ 's are 0.68, 0.56 and 1.62 respectively). The percentile values of

6. J.P. Guilford, Psychometric methods, New York : McGraw-Hill Book Co., Inc., 1954.



t for n=60 and n=120 are 2.00 and 1.98 respectively at 5% level of significance. The number of students on which these statistics were drawn were 80 only.

The significance of mean score differences for extreme cases on Extraversion-Introversion Scale were calculated for Mathematical Ability, Analogy, and Word Meaning tests. Those who scored 18 or over on the Extraversion-Introversion Scale belong to extravert group and those scored 11 and below were categorized as introverts. To test the null hypothesis  $H_1 - H_2 = 0$ , the formula utilised for t becomes

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{s^2 \frac{N_1 + N_2}{N_1 N_2}}}$$

which has student's distribution with  $N_1 + N_2 - 2$  degrees of freedom; where  $\bar{X}$ 's are the mean scores for groups in a given test (6.6 and 7.0, 19.56 and 18.2, 30.3 and 27.2, respectively for tests of Mathematical Ability, Analogy and Word Meaning), N's are numbers of individuals in respective groups (14 and 16 in our case respectively for extravert and introvert groups, who scored 18 or above and 11 or below) and  $s^2$  equals

$$s^2 = \frac{\sum_{i=1}^{N_1} X_{i1}^2 + \sum_{i=1}^{N_2} X_{i2}^2 - \frac{(N_1 \sum_{i=1}^{N_1} X_{i1})^2}{N_1} - \frac{(N_2 \sum_{i=1}^{N_2} X_{i2})^2}{N_2}}{N_1 + N_2 - 2} \quad (\text{see 2, p.156})$$

The results come with the t values of 0.4124, 0.624 and 1.33 respectively for the tests of Mathematical Ability, Analogy, and Word Meaning; all insignificant since the percentile distribution of student's



t with 28 degrees of freedom is 2.05 at 5% level of significance.

### DISCUSSION

Although, at the first glance the distribution of extraversion scores (see Appendix Table I and Figure 1) appears somewhat platykurtic which gives a doubt about the normality of distribution and appears to tend towards bimodality, both chi-square and kolmogorov-Smirnov tests of goodness of fit tend more and more to establish the normality of the distribution. These values of chi-square and D are far far away from the values required to be significant and the probabilities of real differences are too low. However, the deviations from the mean or, in other words, the differences between extraversion and introversion scores seem gemini differences as might be in a normal distribution.

The reliability coefficient of .52 (although not too high) indicates the real value of the Extraversion-Introversion Test, since it is notable that no a priori try-out and item analysis has been performed for the construction of this test. If this would have been done not only reliability is increased but, perhaps, the platykurtic appearance at first glance in the distribution is vanished. It is important to note that only 17 items out of 50 are significantly discriminating the individuals for extraversion or introversion tendencies, however, the discrimination indices for these items are not too high and ranging between .26 to .54 (see Appendix Table IV). These results indicate the reason of low reliability and other discrepancies found in the distribution of scores. Although these indices obtained from upper 27% and lower 27% of sample do not give good values, the distributions of items 5, 7, 15, 24,



27 and 29 into extraversion or introversion score (see Appendix Table I) for all 104 subjects are not much disappointing, since their distribution appears much more similar to the distribution of total scores into extraversion and introversion categories. It is, perhaps, due to small sample of 104 individuals that this discrepancy is persisting. However, on other non-discriminating items the "social-desirability" is, probably, playing the main role for inclination of subjects to choose one specific statement of the two in these items.

The criterion measures of mathematical and verbal abilities for introversion and extraversion respectively could not satisfy the presupposed hypothesis. Both, their low correlation coefficients which were found insignificant and subject to chance fluctuations and the standard errors of differences in mean scores between extreme groups on the criterion tests, indicate no impact of extraversive or introversive tendencies on these abilities. It is notable that, since other factors like age, sex, grade, school etc. were more or less controlled, no concomitant or intervening variable seems to determine the present outcome of results.



## CHAPTER V

### CONCLUSIONS

---

In qualification for the categories given in the Chapter I (p.5), the British psychologists under the leadership of Eysenck can be put under category one. They are propagating for the extraversion-introversion as inherited neurological feature determining the various aspects of human behaviour and as such is a complete dichotomy. As Willett (1, p. 157) states:

"The basic conception related introversion/extraversion to a postulated neurological substruct, the particular balance of inhibition/excitation tendencies characterizing the central nervous system of a particular individual. It was suggested that a state in which inhibitory tendencies are apt to predominate characterizes the extravert while the obverse characterizes the introvert. Now clearly the most parsimonious corolary to this hypothesis would allow of only one mode of activity for such a substruct."

On the other extreme, psychologists in America either treat this concept a misleading and worthless being invalidated

~~~~~

1. R.A. Willett, Measures of Learning and Conditioning. In H.J. Eysenck's (Ed), Experiments in personality. London: Routledge & Kegan Paul., 1960, Vol I, p. 167-192.



on the hypothesized criteria or an environmental adaptation, a characteristic acquired during the life development. As indicated in Chapter II (p.14-15) these psychologists are very much disappointed with the construct and intend to throw it out from the domain of psychology. The present study cross-validates the findings of American psychologists in its full. The results are more or less similar to those found by psychologists like Murray, Guilford, Cattell, etc.

The three controversial issues mainly related to the concept of extraversion-introversion are:

(1) Whether extraversion-introversion seems a worthwhile construct in the field of psychology? Does it actually differentiates the people into two separate categories of introvert and extravert?

(2) Whether these two tendencies can be put on a single continuous scale; extreme cases of this dimension being extraverts and introverts?

(3) Whether these tendencies are acquired during one's struggle of life as the adjustment to the environmental forces or seem inherited from generations, probably, gained in consequence to the laws of evolutionary process?

The present study does not validate the concept of extraversion-introversion. A majority of persons have been found more extraverted and more introverted. The frequency distribution of scores has been proved a normal distribution, and hence, the hypothesis of bimodality has been



rejected. As such, the complete dichotomous characteristic of this construct appears obscure and fictitious. Hence, to prolong the problem of extravert versus introvert, in the light of this study, seems misleading and harmful. As a dimension of personality, this construct does not seem very useful in the study of psychological phenomena.

The tendencies of extraversion and introversion, in this study, are measured on a continuous scale. However, the scores being clustered on the middle of scale are in keen contradiction of continuity. Since the scale prepared was itself dichotomous, extraversion and introversion being correlated perfect negatively, there was no chance for the subjects to check more and more statements on both the sides, otherwise, cases of extreme introversion plus extreme extraversion, perhaps, would have been appeared. It can easily be inferred from these results that these two tendencies are, probably, quite independent and exclusive to each other.

Since no dichotomy appeared on our scale for extraversion-introversion both assumptions of inheritance and acquisition of these tendencies seem unconvincing. However, we are more confirmed about unequivocality of non-inheritance to which the unimodality of the distribution suggests. Moreover the process of adjustment to the environment is less tending into the extreme categories than the inborn characters. Nevertheless, it can be suggested that the same vital energy is directed both way, i.e. inwardly and outwardly, which is most clearly apparent in the extreme cases.



Similar to the results of other studies, the construct is not verified on the criterion variables. However, if the theory of acquisition of the dimensions of extraversion and introversion is accepted it is evident that, since the subjects of this study are in the process of development, no decision can be taken on this point. Moreover, immature personalities are much more similar to each other than those which have gone through the complexities of multiple needs and demands of life.

Although it has been keenly tried to make this study as complete as possible there remained many discrepancies in this study. The inconsistencies of items in their discriminating capacity and in categorical representation should be recovered as far as possible in the future studies of this type. Large sample should be taken from various specific populations of human individuals and repeated replications should be made to confirm the hypothesis. There appears inevitable need of the construction of an extraversion-introversion scale of similar type as was used in the present study. Separate experiments can be performed to take the performances on the scale of extraversion-introversion at one time and to see their impact on criterion variables at the other time. The tools measuring the criterion variables must be well constructed with complete item-analysis, standardization, and proof of reliability and validity. Various devices should be adopted for experimentation and various sources of error and differences should be recognised in different situations. Precautions are needed for strict administration of tests or experiments and all sources of variable error must be controlled as



far as possible. After only so much work and responsibility our results can significantly be able to verify, understand and predict the controversial issues of the construct of extraversion-introversion.



## SUMMARY

Since the publication of Jung's Psychological Types in 1923 the concept of extraversion-introversion has been extended to many directions of human life. The early researches on this topic resulted in doubting the validity of the construct. However, researches in Eysenck's laboratory, in the last decade, more and more tried to establish the construct. A controversy between American and British psychologists is still persisting in this regard.

To tackle the problem in the present study two hypotheses were formulated: (1) If either of the extraversion and introversion clearly predominates in persons the frequency distribution of scores for parallel item extraversion-introversion scale must tend towards bimodality; (2) Notwithstanding the first, if extraversion and introversion are significantly distinguished on the test criterion of verbal and numerical ability the underlying dispositions seem undoubtable.

To gather such an evidence, tests on extraversion-introversion and mathematical ability were constructed and tests of Hindi analogy and word meaning were borrowed from the Department of Psychological Foundations. These four tests were administered on the students of class IX at Malton D.A.V. Jr. Sec. School on two occasions totalling a number of 134 boys in all but only 80 common for all the four tests.

The mean score found for extraversion comes to 14 with an s.d. of 5.57. The standard error of mean differences between extraversion and introversion scores gives a value of 2.57 which is significant at both 5% and 1% level. The chi-square and Kolmogorov-Smirnov tests



for goodness of fit give the respective values of 20.41 and .02 both insignificant. The item-analysis results show 17 items discriminating significantly and 6 items appear to tend discriminating, however, lacking perhaps due to small sample. The Kuder-Richardson Formula 20 gives a reliability coefficient of .52.

The product moment correlation coefficients between extraversion scores and scores on the tests of mathematical ability, analogy, and word meaning were found respectively .08, .06, .18 all insignificant. The performance of extreme cases on extraversion-introversion scale for scores on mathematical ability, analogy, and word meaning gives the *t* - value of mean score differences respectively as .41, .62 and 1.35; all insignificant.

The results indicated a normality in distribution of scores and no impact of any tendency of extraversion and introversion respectively on verbal and mathematical abilities. These results suggest to reject the hypotheses made a priori to this study. However, the necessity of more perfect studies and replications in various situations is emphasised.



## BIBLIOGRAPHY

1. Anastasi, A. Differential psychology. New York: The Macmillan Co., 1958.
2. Anastasi, A. Psychological testing. New York: The Macmillan Co., 1961.
3. Anastasi, A., & Foley, J.P. Differential psychology. New York: The Macmillan Co., 1956.
4. Bain, A. The sense and the intellect. London: Parker, 1855.
5. Bernreuter, R.G. The Fabrication of Tests of Introversion-Extraversion and Neurotic Tendency. J. Soc. Psychol., 1934, 5, 164-201.
6. Garrigan, P.M. Extraversion-Introversion As a Dimension of Personality: A Reappraisal. Psychol. Bull., 1960, 57, 329-360.
7. Cattell, R.B. Personality and motivation: Structure and measurement. Yonkers, N.Y.: World Book, 1957.
8. Collier, R., & Bush, M. Introversion-Extraversion: The Concept and Their Clinical Use. Am. J. Psychiat., 1938, 94, 1045-1075.
9. Davies, J.L., & Vaughan, D.J., (Transl.). The Republic of Plato. New York: Burt, 1947.
10. Davis, F.B. Item-analysis data: their computation, interpretation and use in test construction. Cambridge, Massachusetts: Graduate School of Education, Harvard University, 1949.
11. Eysenck, H.J. Dimensions of personality. London: Routledge and Kegan Paul, 1947.
12. Eysenck, H.J. The structure of human personality. London: Methuen, 1953.
13. Eysenck, H.J. The Inheritance of Extraversion-Introversion. Acta Psychol. Amsterdam., 1956, 12, 95-100.
14. Eysenck, H.J. Experiments in personality. Vol. I. London: Routledge & Kegan Paul, 1950.
15. Fisher, R.A., & Yates, F. Statistical tables for biological, agricultural, cultural and medical research. Edinburgh: Oliver and Boyd Ltd., 1963.
16. Jordham, M. New developments in analytical psychology. London: Routledge & Kegan Paul, 1957.
17. Freeman, F.S. Theory and practice of psychological testing. New York: Holt, Rinehart & Winston, Inc., 1960.



16. Freud, S. General introduction to psycho-analysis. New York: Liveright, 1920.
19. Gage, N.L., (Ed.). Handbook of research on teaching. Chicago: Rand McNally and Co., Inc., 1952.
20. Galton, F. Inquiries into human faculty and its development. London: Macmillan, 1883.
21. Goode, W.J., & Hatt, P.K. Methods in social research. New York: McGraw-Hill Book Co., Inc., 1952.
22. Guilford, J.P. Psychometric methods. New York: McGraw-Hill Book Co., Inc., 1954.
23. Guilford, J.P. Fundamental statistics in psychology and education. New York: McGraw-Hill Book Co., Inc., 1956.
24. Johnson, D.M. Psychology: a problem-solving approach. New York: Harper & Bros., 1961.
25. Jung, C.G. Psychological types. London: Routledge & Kegan Paul, 1923.
26. Marx, M.H., & Millix, M.A. Systems and theories in psychology. New York: McGraw-Hill Book Co., Inc., 1963.
27. Murray, H.A. Explorations in personality. New York: Oxford University Press, 1938.
28. O'Connor, N. Russian Soviet psychology. Oxford: Pergamon Press, 1961.
29. Pavlov, I.P. (1951-52) Poln. Sbbr. nach. (Complete Works), III, Bk 2.
30. Ross, W.D., (Ed.). The works of Aristotle. Vol. IX. Oxford: Clarendon Press, 1915.
31. Siegel, S. Non-parametric statistics for the behavioural sciences. New York: McGraw-Hill Book Co., Inc., 1956.
32. Stern, W. Ueber Psychologie der individuellen Differenzen. Leipzig: Barth, 1900.
33. Vernon, P.E. The assessment of psychological qualities by verbal methods. London: H.M. Stationery Office, 1938.
34. Walker, H.M., & Lev, J. Statistical inference. New York: Henry Holt and Co., 1953.
35. Webster, H. Planning education research. (Unpublished).
36. Williams, R.J. Biological individuality: the basis for the psychobiologic concept. New York: Wiley, 1958.







TABLE I

Scores of 104 students on Extraversion-Introversion Scale

Scores (x)	Frequencies (f)	$(x^2)$	$(fx)$	$(fx^2)$	Calculations
4 and below	0	-	-	-	
5	1	25	5	25	Mean $= \frac{fx}{N} = 14$
6	5	36	18	108	
7	0	49	0	0	Standard Deviation:
8	4	64	32	256	$\sigma = \sqrt{\frac{1}{N} \sum fx^2 - (\sum x)^2} = 3.57$
9	4	81	36	324	
10	3	100	30	300	Standard Error of Mean:
11	9	121	99	1089	$\sigma_M = \frac{\sigma}{\sqrt{N-1}} = 0.35$
12	12	144	144	1728	
13	9	169	117	1521	Standard Error of S.D.:
14	11	196	154	2156	
15	13	225	195	2925	$\sigma_\sigma = \sqrt{\frac{\sigma}{2N}} = 0.247$
16	8	256	128	2048	
17	11	289	187	3179	
18	4	324	72	1296	
19	4	361	76	1444	
20	7	400	140	2800	
21	0	441	0	0	
22	1	484	22	484	
25 and above	0	-	-	-	
$\sum$	104		1455	21585	



TABLE II

## Chi-square Calculations for Goodness of Fit

Score	Deviations x	Standard Scores z	Ordinate y	Expected Frequency $f_e$	Observed frequency $f_o$	$f_o - f_e$	$(f_o - f_e)^2$	$\frac{(f_o - f_e)^2}{f_e}$
4	-4.0	-2.801	.0079	0.25	0	- .25	.0529	0.250
5	-3	-2.521	.0167	0.49	1	.51	.2601	0.531
6	-2	-2.215	.0345	1.00	5	2.00	4.0000	4.000
7	-1	-1.961	.0585	1.70	0	-1.70	2.8900	1.700
8	0	-1.681	.0971	2.85	4	1.17	1.5689	0.484
9	+1	-1.401	.1495	4.35	4	-0.35	.1225	0.028
10	+2	-1.120	.2151	6.21	5	-3.21	10.8041	1.659
11	+3	-0.840	.2805	8.17	9	0.88	.6889	0.084
12	+4	-0.560	.3410	9.95	12	2.07	4.2349	0.432
13	+5	-0.280	.3936	11.17	9	-2.17	4.7089	0.422
14	0	0.000	.5989	11.82	11	-0.62	.3844	0.035
15	+1	0.280	.5856	11.17	15	1.85	3.5489	0.500
16	+2	0.560	.5410	9.95	8	-1.95	3.7249	0.375
17	+3	0.840	.2805	8.17	11	2.85	8.0089	0.980
18	+4	1.120	.2151	6.21	4	-2.21	4.8841	0.797
19	+5	1.401	.1495	4.35	4	-0.55	.1225	0.028
20	+6	1.681	.0971	2.85	7	4.17	17.5689	6.144
21	+7	1.961	.0585	1.70	0	-1.70	2.8900	1.700
22	+8	2.215	.0345	1.00	1	0	.0036	0.000
23	+9	2.521	.0167	0.49	0	-0.49	.2401	0.490
24					0	-0.49	.2401	0.490
25					0	-0.49	.2401	0.490

For 19 d.f. (two failed)

M = 14  
σ = 5.57

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e} = 20.411$$

χ<sub>.05</sub><sup>2</sup> = 52.9  
χ<sub>.01</sub><sup>2</sup> = 58.6



TABLE III

Cumulative Proportions for Expected and Observed Frequency  
and the Differences 'D'.

Scores	Expected Frequency Proportions	Observed Frequency Proportions	Cumulative Proportions for $f_e$	Cumulative Proportions for $f_o$	p
4.	.0022	.0000	.0022	.0000	.0022
5	.0046	.0096	.0068	.0096	.0028
6	.0091	.0288	.0159	.0384	.0225
7	.0163	.0000	.0322	.0384	.0062
8	.0272	.0585	.0594	.0769	.0175
9	.0420	.0585	.1014	.1154	.0140
10	.0698	.0288	.1812	.1442	.0170
11	.0788	.0865	.2598	.2507	.0091
12	.0955	.1154	.3553	.3481	.0180
13	.1074	.0865	.4427	.4326	.0101
14	.1117	.1058	.5544	.5384	.0160
15	.1074	.1250	.6818	.6654	.0016
16	.0955	.0789	.7573	.7405	.0170
17	.0788	.1058	.8559	.8461	.0102
18	.0598	.0585	.8957	.8846	.0111
19	.0420	.0385	.9577	.9251	.0146
20	.0272	.0673	.9649	.9904	.0256*
21	.0163	.0000	.9812	.9904	.0092
22	.0091	.0096	.9903	1.0000	.0097
23	.0046	.0000	.9949	1.0000	.0051

\* Value at 1% level is .16 and at 5% level is .153.



TABLE IV

Item-Analysis Data for 104 Students on Extraversion Scale

Item No.	Higher 27% Sample (n <sub>1</sub> =27)		Lower 27% of sample(n <sub>2</sub> =28)		Dis. tinction Index
	No. of Passes	Percentage of success	No. of Passes	Percentage of success	
1	16	59	5	11	.56
2	21	78	12	43	.24
3	13	48	11	39	.08
4	16	59	6	21	.26
5	20	74	15	54	.15
6	15	56	5	11	.34
7	15	48	6	21	.19
8	21	78	17	61	.10
9	27	100	25	89	.27
10	21	78	18	64	.10
11	18	67	8	29	.24
12	6	22	2	7	.17
13	15	56	7	25	.22
14	14	52	6	21	.21
15	19	70	14	50	.15
16	22	81	9	29	.36
17	28	56	7	25	.22
18	9	33	2	7	.28
19	24	89	17	61	.15
20	18	67	5	18	.35
21	17	63	3	11	.29
22	17	63	6	21	.21
23	26	96	23	82	.21
24	18	67	12	43	.15
25	18	67	10	36	.20
26	13	48	*	0	.04
27	18	48	11	39	.04
28	9	33	4	11	.04
29	11	41	28	51	.04
X.O.	10	36	13	31	.04



TABLE X

## Extraversion and Introversion Responses and Reliability Coefficient

Item No.	No. of Passes on Introversion	No. of Passes on Extraversion	Proportion of Introversion Response p	Proportion of Extraversion Response q (1-p)	pq	Calculations
1	65	41	0.60	0.40	0.2400	
2	40	64	0.40	0.60	0.2400	$r_{tt} = \left( \frac{n}{n-1} \right) \left( \frac{\sigma_t^2 - \sum pq}{\sigma_t^2} \right)$
3	58	46	0.56	0.44	0.2464	$= 30 \cdot \frac{15.57 - 6.5526}{29} \cdot \frac{15.57^2}{(15.57)^2}$
4	68	56	0.65	0.35	0.2275	$= 0.52$
5	53	71	0.52	0.68	0.2176	
6	60	44	0.58	0.42	0.2436	
7	84	40	0.62	0.38	0.2546	
8	25	79	0.24	0.76	0.1824	
9	9	95	0.09	0.91	0.0819	
10	31	73	0.30	0.70	0.2100	
11	55	49	0.53	0.47	0.2491	
12	77	27	0.74	0.26	0.1924	
13	62	42	0.60	0.40	0.2400	
14	60	44	0.58	0.42	0.2436	
15	45	61	0.41	0.59	0.2419	
16	54	50	0.52	0.48	0.2496	
17	67	37	0.64	0.36	0.2304	
18	85	21	0.60	0.20	0.1600	
19	15	89	0.14	0.86	0.1204	
20	52	52	0.50	0.50	0.2500	
21	65	59	0.625	0.375	0.2544	
22	51	55	0.50	0.50	0.2500	
23	11	95	0.11	0.89	0.0979	
24	40	64	0.38	0.62	0.2546	
25	54	50	0.52	0.48	0.2496	
26	85	19	0.82	0.18	0.1476	
27	54	50	0.52	0.48	0.2496	
28	85	19	0.82	0.18	0.1476	
29	68	56	0.65	0.35	0.2275	
30	77	27	0.74	0.26	0.1924	
		$\Sigma$	15.505	14.495	15.5386	



# अंतर्मुख-वहिनीस परीक्षा प्रस्तावली

नाम

पिता का नाम

दृष्टा विभाग

विधालय

प्रस्तुतकर्ता:

श्याम सुन्दर मिश्र

मनोविज्ञान प्रतिष्ठान

राष्ट्रीय शैक्षणिक विद्युसंधान स्वं प्रशिक्षण परिषद्

संच. २ माडल टाउन, दिल्ली - ६



## निर्देशः

इस पत्रिका में ३० प्रश्न हैं जो तुम्हारे व्यक्तित्व की परीक्षा के लिए उन्नेश्य हैं। यह तुम्हारी बुद्धि परीक्षा नहीं है और न कोई प्रश्न राहीं या गलत है। प्रत्येक प्रश्न में दो कथन के और उन दिए हुए हैं। अपने मन में भली प्रकार सोचो, जो कथन तुम्हारे लिए ठीक हो या लागू होता हो उस पर राहीं (✓) का निशान लगा दो। ध्यान रखो जिनां सोचे समझे निशान न लाओ। आपको कोई प्रश्न छोड़ना नहीं है। यदि तुम्हें निशान बदलना हो तो पहले लगाए निशान जो फाट (✗) दो और प्रश्न के द्वारा भाग में राहीं (✓) का निशान लगा दो।

### उदाहरणः

(१) क. लोगों के द्वारा प्रशंसा की आशा आपके किसी अच्छे कार्य की प्रेरणा देती है।

ख. कोई अच्छा कार्य करने पर आपको धात्मक शान्ति मिलती है।

उपर्युक्त उदाहरण में उ भाग दिसी के बारे में लागू हुआ है अतः उस व्यक्ति ने उ पर राहीं (✓) का निशान लगाया है।

(२) क. आपके जीवन का मुख्य उद्देश्य आपके दृढ़य की प्रेरणा से निर्मित हुआ है।

ख. आपके जीवन का मुख्य उद्देश्य भौतिक सत्यों की प्रेरणा स्वरूप निर्मित हुआ है।

उपर्युक्त उदाहरण में पहले दिसी व्यक्ति ने उ पर राहीं (✓) का निशान लगाया तिन्हुं उसने उसे बदलना चाहा व्यांकि कि उस पर अधिक राहीं उत्तरता है अतः उ दो फाट (✗) कर फिर से उ पर राहीं (✓) का निशान लगा दिया। नीचे दिये ३० प्रश्नों में से प्रत्येक प्रश्न में दो कथन के और उन में से जो एक कथन तुम्हारे बारे में राहीं हो उस पर राहीं (✓) का निशान लगा दो और द्वितीय कथन पर जो तुम्हारे बारे में राहीं नहीं है, कोई निशान मत लगाओ। ध्यान रखो प्रत्येक प्रश्न में एक ही कथन पर राहीं का निशान लगाना है। सभी प्रश्नों का उत्तर देना है।

(१) दिस प्रकार के सेलों में भाग लेने में आपको हार्दिक शान्ति मिलता है :

क. जिनमें खब भाग कोड़ दोती है।

ख. जिनमें बुद्धि द्वा उपयोग होता है।

(२) यदि जाप जड़क पर वा रहे थे तो जास जान नहीं कर सकते हैं ; तो जास का तमाशा, सस्ता विद्वय वा नीलाय, दुर्घटना, झारी म गढ़े रत्नादि - वापको

क. आजूर्धित नहीं करती ।  
 ख. आजूर्धित करती है ।

(३) यदि बापको टल्ले जाना हो तो जाप द्वारा स्थान पर्याप्त नहीं कर सकता है ।

क. छब चहल पहल हो ।  
 ख. छब चहल पहल हो ।

(४) क. मनुष्यों की भीड़ में युलगर दानन्द लेना बापको दुर्भागा है ।  
 ख. भीड़ में लगार आपका जी ऊब जाता है ।

(५) क. परिस्थिति जो कही दुश्लता और गाहुरी ऐसी हो तुरुक जैसे ता प्रयत्न आप करते हैं ।  
 ख. परिस्थितियों जो टालने का प्राप्त आप नहीं करते ।

(६) क. सामाजिक प्रशंसा बापको दुर्जार्य की प्रेरणा देती है ।  
 ख. रामाज चाहे अच्छा नहै वा दुरा, आप वही जो नहीं है तो आप दूरा कहता है ।

(७) क. अपरिचितों से भी आप शीघ्र ही परिचितों जी जांगि दुर्जार्य होते हैं ।  
 ख. अपरिचितों से मिलने में बापको दुर्द किम्बार भाद्रा देती है ।

(८) क. राफर को आप मुसाफिरों से जातनीत है गुजारते हैं ।  
 ख. राफर को आप स्वगिन्तन अथवा दधान है गुजारते हैं ।

(९) क. किसी रामाजिक अथवा व्यक्तिगत जार्ये की जैसी जीवन आग जाहे तो आप वहे उत्तराह से बोग देते हैं ।  
 ख. सामाजिक अथवा व्यक्तिगत जार्ये की जागे जागे होना जाने वहा छटपटा रा लगता है ।

१०) क. किसी रामारोह की व्यवस्था में, जोई जान न हो, ताप उत्तराह से लग जाते हैं ।  
 ख. किसी रामारोह की व्यवस्था ता भार ग्रहण करने में जाग दुर्द संतोष का जनुभव करते हैं ।

११) क. यदि कोई रामाजिक जार्ये कर्ता अथवा दुश्लधानदर्जा दुर्द जानलारी नाहे तो आप स्वयं प्रवृत्त दोकार मिस्सेलोप रूप है रभी जाते ज्वाने रज जाते हैं ।  
 ख. उपर्युक्त अवस्था में द्वारी जानलारी के बिना दुर्द भी ज्वाने में रामानो भिम्फक लगती है ।

१२) क. प्रारंभिक परिणाम में दोपकां लोग भली भ्रातार नहीं रहते फार्म बिन्दु ज्यों ज्यों जमीप धाते जाते हैं दोपकां उनका सम्बन्ध गाढ़ा होता जाता है ।  
 ख. प्रारंभिक परिणाम में दोपकों लोग बहुत अधिक प्रभावित होते हैं बिन्दु सम्बन्ध दृढ़ने पर न जाने क्यों वह वात नहीं रहती ।

१३) क. किसी वात जो आदर रखने के लिए अक्सर जाप उसे किसी घन्य वात से, जो दोपकां भली प्रकार आदर होती है, सम्बन्धित कर लेते हैं ।  
 ख. जब तक किसी वात पर आप चिन्तन-गमन नहीं कर लेते तब तक वह आपको भली भ्रातार याद नहीं रहती ।

१४) क. दोपका चिन्तन कार्यक्रम में परिणाम लाने के लिए होता है ।  
 ख. अत्यन्त जरने जी दोपकों आदत हो गई है ।

१५) क. कार्य अथवा चिन्तन में आप इतने दृचनिच्छ हो जाते हैं कि दोपकों उन्हें लाएँ दोर की अवस्था जो कोई भी ध्यान नहीं रहता ।  
 ख. कार्य अथवा चिन्तन के अभ्यधि भी आप इतने सज्जे रहते हैं कि तनिक जा व्यवधान भी दोपका ध्यान जारीर्थित कर लेता है ।

१६) क. आप अपने रिद्धान्त के विरोध में न कुछ दुक्का चाहते हैं और न देखना उरा पर तर्फे करना भी कभी कभी आप प्रान्द नहीं करते ।  
 ख. अपने विद्यारों को प्रभावशील बनाने के प्रति आपको एक दायरता री रहती है क्योंकि उनकी सफलता के प्रति आप गे एक शंका री की रहती है ।

१७) क. दोपका चिन्तन प्रायः शापकी जानकारी पर आधारित रहता है । कोई गौलिक विजार, जिनके तारे में आपने जाना चुना नहीं हो, उपरोक्त गति नहीं जाते ।  
 ख. रिद्धान्त आपमें पहुँचे जाते हैं फिर आप उनके लिए प्राप्त ज्ञान सोजते हैं न कि प्राप्ति के मिलने पर रिद्धान्त बनाने की चेष्टा करें ।

१८) क. शिष्टाचार-प्रदर्शन को आप जन्मता का एक धृण गमकते हैं ।  
 ख. हृदय की रच्चाई को शिष्टाचार की जपेक्षा आप अधिक महत्व देते हैं ।

१९) क-दोपका विरोध या आलोचना होने पर भी आप धैर्य नहीं लाते और अस्थिति को समालोचना प्रयत्न दरते रहते हैं ।  
 ख-उचित आलोचना पर भी आप प्राप्त दुर्दृष्ट हो जाते हैं ।

२०) क. सहानुभूति आप शब्दों और व्यंजनों कोनों में व्यक्त करते हैं ।  
 ख. यथापि सहानुभूति आपको हृदय में होती है । किन्तु व्यवहार में आप उपरोक्त व्यक्त नहीं कर पाते ।



## गणितीय योग्यता परीक्षा

नाम —  
पिता का नाम  
कक्षा — विभाग  
विधालय —

प्रस्तुत कर्ता  
रथाम सुन्दर मिश्र  
मनोविज्ञान प्रतिष्ठान  
राष्ट्रीय शैक्षणिक अनुसंधान स्व. प्रशिक्षण परिषद्  
स्व. २/३, नाड़ल टाउन, दिल्ली-६



प्ररन है। जापको रभी प्ररन करने हैं। प्रत्येक प्ररन का जवाब शुब लोच राम कर दीजिए। उचर निरिधत स्थान पर ही लिखिए। जन्रिला के बन्त में लो हुए और कागजों पर लाप 'एफ' काम कर लगते हैं।

प्ररन न० ३ में तुम्हें श्रेणियाँ के दो पद 'द्वारा फरो' के बाद दी हुई दो पंक्तियाँ पर लिखने हैं। प्ररन न० २,३ और ४ में तारांशित स्थानों पर स्पष्ट रूप से जपने उचर लिखते जाइए। प्ररन न० ५ में प्रत्येक प्ररन के बाद उचर के लिए रेखा लिखी है उसी पर बनता उचर लिखिए। प्ररन न० ६ और ७ में प्रत्येक प्ररन के कई राम्भावित उचर दिए गए हैं जो उचर जापको राही लो उत्तम जगेजी बढ़ा सकार प्ररन के नीचे दी हुई रेखा पर लिखिए।

(१) तुम्हें निम्नलिखित श्रेणियाँ दो पूरा करना है। ध्यान रसी रामीदारणों में दीज (धजार) का मान कोई रखना है। प्रत्येक श्रेणी के पदों को ध्यान से देखो और आगे के दो पद लिखो।

क. ध्यान दो :

$$\begin{aligned} 12 \times p &= 108 \\ 123 \times p &= 1107 \\ 1234 \times p &= 11106 \\ 12345 \times p &= 111105 \end{aligned}$$

पूरा करो :

ख. ध्यान दो :

$$\begin{aligned} (2) \times p &= 2048 \\ (2) \times p &= 2048 \\ (2) \times p &= 2048 \\ &= 2048 \end{aligned}$$

पूरा करो

ग. ध्यान दो :

भाजक	भाज्य	भूजनफल	शेष
p	13 x q	r + 5	1
p	14 x q	r + 7	2
p	16 x q	r + 12	1
p	17 x q	r + 14	2
p	19 x q	r + 19	1

(2) निम्नलिखित प्रस्तुति में तारांकित स्थानों को पूरा करें। ध्यान रखें कि तारांकित स्थानों पर रखी हुई अंकाएँ प्रस्तुत की दृष्टि से गलत्वपूर्ण हैं और वे प्रस्तुत को तारांकित स्थानों पर पूरा कर रही हैं।

क.

$$\begin{array}{r}
 4 \ 7 \ 5 \ * \ 0 \ 6 \\
 * \ 2 \ * \ 6 \ 7 \ 3 \\
 3 \ * \ * \ 3 \ 1 \ * \\
 6 \ 7 \ 9 \ 3 \ * \ 5 \\
 \hline
 \text{---} \ 2 \ 1 \ 6 \ 5 \ 2 \ 8
 \end{array}$$

ख.

$$\begin{array}{r}
 * \ 3 \ 6 \\
 3 \ * \ 7 \\
 \hline
 6 \ 5 \ * \ 2 \\
 5 \ * \ 1 \ 6 \\
 2 \ 8 \ * \ * \\
 \hline
 * \ * \ 3 \ * \ 1 \ 2
 \end{array}$$

ग.

$$\begin{array}{r}
 3*q + 5* + *n \\
 *p + q \\
 \hline
 6p^2* + **pm + 14*n \\
 + *p* + 5m* + 7qn
 \end{array}$$

(3) निम्नलिखित प्रस्तुति में तारांकित स्थानों पर वाई गणित विन्दु दोनों चाहिए था। प्रश्न को ध्यान रखते हुए उचित विन्दु लक्षित करें।

क.

$$\frac{7*6}{3} * 3 = 13$$

ख.

$$\frac{(p*q)}{p} * \frac{(r*s)}{s} = 1 * s^2$$

ग.

$$\left\{ (2p * p) - 3 * q + r \right\} = 3(q * \frac{r}{s}) - 2$$

(4) निम्नलिखित श्रेणियों में जहाँ तारांकित स्थान है उनको क्रम को स्थान रखते हुए मरो :

A. 0, 1, 4, 9, \*, 25, \*  
 B. 3, 2, 6, 4, 9, 6, 12, 8, 15, \*, \*.  
 C. 3, 5, 9, 17, 33, \*, 129, \*

(5) क. निम्नलिखित संख्याओं को जोड़ो :

(क)	5072975706	(ख)	379253	(ग)	137296432
(च)	3607520003	(द)	976725976	(ज)	137020300037

उत्तर

ख. निम्नलिखित का झौरात वर्गमूल दो दशमलव अंकों तक ज्ञात करो :

$$9, 11, 20, 36, 51, 49, 25, 16, 14, 18$$

उत्तर

ग. निम्नलिखित संख्याओं के द्वारा से अन्तर के बर्ग का धोखत

ज्ञात करो :

$$7, 13, 10, 16, 11, 6, 8, 13, \frac{19}{3}$$

उत्तर

(6) क. प्रतिनारंगी  $a$  पैसा तथा प्रति केला  $b$  पैसा के भाव से

दिलता है। यदि एक वाक्ति  $c$  पैसे गे 2 नारंगी और 3 केला सरीदता है तो निम्नलिखित में कौन सा समीकरण उसके कथन को संतुष्ट करता है :

A.  $2a + 3b = c$   
 B.  $3a + 2b = c$   
 C.  $5ab = c$   
 D.  $6ab = c$

उत्तर

ख. किसी त्रिभुज की एक भुजा  $a$  का बर्ग त्रिभुज की दोन्या भुजाओं  $b, c$  के योग के तीन गुने से पांच गुणिक है। निम्नलिखित में से कौन सा समीकरण उपयुक्त रहेगा ?

A.  $a^2 - 5 = \frac{b + c}{3}$   
 B.  $a + 5 = \sqrt{3(b + c)}$   
 C.  $a^2 = 3(b + c) + 5$   
 D.  $a^2 = 3bc + 5$

उत्तर

7. (10) और श्याम की राशुक धारा में 17 वर्ष पटा करने से धारा देने पर आने वाले फूजनफल के न्यून का  $\frac{2}{3}$  धारा नोट्स की धारा के द्वारा वर्गूल है। यदि धारा की धारा p, श्याम की धारा q और नोट्स की धारा r वर्ष हो, तो कौन सा न्यूनकारण उपर्युक्त होगा :

A.  $(p + q) - 17 = \sqrt{\frac{2r}{3}}$

B.  $\frac{2}{3} (p - 17 + q) = 3 \sqrt{\frac{2r}{3}}$

C.  $\frac{2}{3} \sqrt{p + q - 17} = \frac{2r}{3}$

D.  $\frac{2}{3} \left( \frac{p + q - 17}{3} \right)^2 = \sqrt{2r}$

(7) क.  $\frac{(2.30)^2 - (1.20)^2}{2}$  को राख दर्शाने में निम्नलिखित में से कौन सा न्यून उपयोगी रहेगा :

A.  $(a + b)^2 + (a - b)^2 = 2a^2 + 2b^2$

B.  $(a + b)^2 - (a - b)^2 = 4ab$

C.  $(a + b)(a - b) = a^2 - b^2$

D.  $(a + b)^2 = a^2 + b^2 + 2ab$

E.  $(a - b)^2 = a^2 + b^2 - 2ab$

8.  $4a^3 - 25a x^2$  के गुणनखण्ड करने में निम्नलिखित में से कौन सा सूत्र मुख्यतः उपयोगी रहेगा ।

A.  $a^3 - b^3 = (a - b) + 3ab (a + b)$

B.  $(a + b)(a - b) = a^2 - b^2$

C.  $(a + b)^2 - (a - b)^2 = 4ab$

D.  $a^3 + b^3 = (a + b)^2 - 3ab (a + b)$

E.  $(a + b)^2 - (a - b)^2 = 2a^2 + 2b^2$

9. यदि  $x + \frac{1}{x} = 2$  तो  $x^3 + \frac{1}{x^3}$  का मान ज्ञात करने के लिए निम्नलिखित में से कौन सा न्यून उपयोगी होगा ?

A.  $(a - b)^3 = a^3 - 3ab (a - b) - b^3$

B.  $(a - b)(a^2 - b^2) = a^3 + b^3 - ab (a + b)$

C.  $(a - b)(a + b)^2 = a^3 - b^3 + ab (a - b)$

D.  $a^3 + b^3 = (a + b)^3 - 3ab (a + b)$

E.  $(a + b)(a^2 - ab + b^2) = a^3 + b^3$



**National Institute of Education**  
(NATIONAL COUNCIL OF EDUCATIONAL RESEARCH & TRAINING)

**सम्बन्ध-निर्धारण परीक्षण**

Test Code :	
Student No. :	
M.....	F.....
A.....	Gr.....
S.....	H..... C.....
MT.....	P.....
R'	W..... O.....
LIA.....	k.....
R.....	T.....
U.....	L.....

Name..... Roll No.....

Age ..... Boy/Girl.....  
(Cross which does not apply)

School ..... Class..... Section.....

Mother Tongue.....

Number of years Hindi has been medium of your instruction .....

Subjects : Write below your compulsory and optional subjects.

Compulsory Subjects :— .....

Optional Subjects :— .....

## सम्बन्ध-निर्धारण परीक्षण

क्या करना है :

दिये हुए प्रत्येक वाक्य में तीन शब्द भोटे अक्षरों में लिखे हुए हैं, और एक स्थान रिक्त है। एक और के दोनों शब्दों में एक विशेष सम्बन्ध है। प्रत्येक रिक्त स्थान पर सम्बन्धित शब्द लिखो।

रेखा पर एक ही शब्द लिखना है। ध्यान रहे लिखा जाने वाला शब्द केवल उपसर्ग या प्रत्यय लगाकर न बना हो।

भाग क

उदाहरण

जैसे आकाश का सम्बन्ध नीले से है, वैसे ही पत्तों का सम्बन्ध हरे से।

दिये हुए वाक्य में 'आकाश' और 'नीले' में यह सम्बन्ध है कि आकाश का रंग नीला है। ऐसा ही सम्बन्ध 'पत्तों' और 'हरे' में है। इसलिए छोड़े हुए स्थान पर 'हरे' शब्द लिखा गया है।

१. जैसे खटमल का सम्बन्ध कोड़ा से, वैसे ही शेर का सम्बन्ध ..... से।
२. जैसे मधुमक्खी का सम्बन्ध शहद से, वैसे ही गाय का सम्बन्ध ..... से।
३. जैसे झूठ का सम्बन्ध सत्य से, वैसे ही पाप का सम्बन्ध ..... से।
४. जैसे नाव का सम्बन्ध माझी से, वैसे ही हाथी का सम्बन्ध ..... से।
५. जैसे बालक का सम्बन्ध बृद्ध से, वैसे ही नथा का सम्बन्ध ..... से।
६. जैसे क्षुधा का सम्बन्ध भोजन से, वैसे ही रोग का सम्बन्ध ..... से।
७. जैसे पैर का सम्बन्ध पायल से, वैसे ही अँगुली का सम्बन्ध ..... से।
८. जैसे ज़ूता का सम्बन्ध मोची से, वैसे ही घड़ा का सम्बन्ध ..... से।
९. जैसे क का सम्बन्ध ग से, वैसे ही त का सम्बन्ध ..... से।
१०. जैसे यन्त्र का सम्बन्ध यान्त्रिक से, वैसे ही सौन्दर्य का सम्बन्ध ..... से।

## भाग ख

रिक्त स्थान पर सम्बन्धित शब्द लिखो ।

## उदाहरण

जैसे बीज का सम्बन्ध पौदे से, वैसे ही अण्डे का सम्बन्ध पक्षी से ।

रिक्त स्थान पर 'अण्डे' शब्द ठीक बैठता है ।

११. जैसे जन्म का सम्बन्ध शैशव से, वैसे ही ..... का सम्बन्ध मरण से ।
१२. जैसे उपासक का सम्बन्ध पूजा से, वैसे ही ..... का सम्बन्ध भीख से ।
१३. जैसे श्रविभाजित का सम्बन्ध श्रविभाज्य से, वैसे ही ..... का सम्बन्ध अज्ञेय से ।
१४. जैसे लिखने का सम्बन्ध पेंसिल से, वैसे ही ..... का सम्बन्ध कुदाल से ।
१५. जैसे पल का सम्बन्ध घड़ी से, वैसे ही ..... का सम्बन्ध माशा से ।
१६. जैसे सोचता का सम्बन्ध सोचते से, वैसे ही ..... का सम्बन्ध काले से ।
१७. जैसे सूर्योदय का सम्बन्ध दिन से, वैसे ही ..... का सम्बन्ध रात्रि से ।
१८. जैसे तू का सम्बन्ध तेरा से, वैसे ही ..... का सम्बन्ध उनका से ।
१९. जैसे गाड़ी का सम्बन्ध पहिया से, वैसे ही ..... का सम्बन्ध हाथ से ।
२०. जैसे सुन्दर का सम्बन्ध सुन्दरी से, वैसे ही ..... का सम्बन्ध बैल से ।
२१. जैसे शब्द का सम्बन्ध शब्दिक से, वैसे ही ..... का सम्बन्ध सर्वांगम से ।
२२. जैसे फल का सम्बन्ध आम से, वैसे ही ..... का सम्बन्ध गुलाब से ।

## भाग ग

रिक्त स्थान पर सम्बन्धित शब्द लिखो ।

## उदाहरण

जैसे कवि का सम्बन्ध कविता से, वैसे ही शिल्पी का सम्बन्ध प्रतिमा से ।

छोड़े हुए स्थान पर कविता शब्द उपयुक्त है ।

२३. जैसे बछिया का सम्बन्ध ..... से, वैसे ही पौधा का सम्बन्ध ..... पेड़ से ।
२४. जैसे सन्ध्या का सम्बन्ध ..... से, वैसे ही उषा का सम्बन्ध ..... पूर्व से ।

२५. जैसे अधिक का सम्बन्ध ..... से, वैसे ही निकट का गम्यन्थ निकटता से ।
२६. जैसे उत्तम का सम्बन्ध ..... से, वैसे ही प्रिय का सम्बन्ध सर्वप्रिय से ।
२७. जैसे नीम का सम्बन्ध ..... से, वैसे ही गधा का सम्बन्ध पशु से ।
२८. जैसे चीता का सम्बन्ध ..... से, वैसे ही बकरी का सम्बन्ध शाकाहारी से ।
२९. जैसे मछली का सम्बन्ध ..... से, वैसे ही मृग का सम्बन्ध भूचर से ।
३०. जैसे सुन्दर का सम्बन्ध ..... से, वैसे ही उच्च का सम्बन्ध उच्चतम से ।

### भाग घ

रिक्त स्थान पर सम्बन्धित शब्द लिखो ।

### उदाहरण

जैसे ठोस का सम्बन्ध तरल से, वैसे ही खुला हुआ का सम्बन्ध बन्द से ।

रिक्त स्थान पर ठोस शब्द उपयुक्त है ।

३१. जैसे ..... का सम्बन्ध कनिष्ठ से, वैसे ही मोटा का सम्बन्ध दुबला से ।
३२. जैसे ..... का सम्बन्ध शत्रु से, वैसे ही सूक का सम्बन्ध वाचाल से ।
३३. जैसे ..... का सम्बन्ध हानि से, वैसे ही आय का सम्बन्ध व्यय से ।
३४. जैसे ..... का सम्बन्ध सरल से, वैसे ही सूक्ष्म का सम्बन्ध स्थूल से ।
३५. जैसे ..... का सम्बन्ध दोष से, वैसे ही निन्दा का सम्बन्ध स्तुति से ।
३६. जैसे ..... का सम्बन्ध महिला से, वैसे ही धनी का सम्बन्ध दरिद्र से ।
३७. जैसे ..... का सम्बन्ध मरण से, वैसे ही आदि का सम्बन्ध श्रन्ति से ।
३८. जैसे ..... का सम्बन्ध धूला से, वैसे ही नीचता का सम्बन्ध उदारता से ।
३९. जैसे ..... का सम्बन्ध परोक्ष से, वैसे ही अग्र का सम्बन्ध पश्चात् से ।
४०. जैसे ..... का सम्बन्ध भारी से, वैसे ही अपना का सम्बन्ध पराया से ।



**National Institute of Education**  
(NATIONAL COUNCIL OF EDUCATIONAL RESEARCH & TRAINING)

**शब्दार्थ ज्ञान परीक्षण**

Test Code :

Student No. :

M..... F.....

A..... Gr.....

S..... H..... C.....

MT ..... P.....

R'..... W..... O.....

LIA..... k.....

R..... T.....

U..... L.....

Name..... A.U. Bhu shan..... Roll No..... 33.....

Age..... 15 year..... Boy/Girl..... Boy.....  
(Cross which does not apply)

School..... Multan D.A.V.H.S...... Class..... IX - C..... Section..... A.....

Mother Tongue.....

Number of years Hindi has been medium of your instruction.....

Subjects : Write below your compulsory and optional subjects.

Compulsory Subjects :— English, Hindi, Math.

Optional Subjects :— Economic, Drawing.

**TALENT PROJECT**

(NIE-HEW/OE-4-21-008)

Department of Psychological Foundations

H 2/6 Model Town, Delhi-9.

## शब्दार्थ ज्ञान परीक्षण

क्या करना है

मोटे अक्षरों में बाईं ओर कुछ शब्द दिए गए हैं। और प्रत्येक के दाईं ओर पांच शब्द दिये हुए हैं, उनमें से उस शब्द (मोटे अक्षरों में लिखित) का अर्थ चुनकर उसे रेखांकित कीजिए।

### उदाहरण

बृक्ष	फूल	चिड़िया	फल	पेड़	छाया
-------	-----	---------	----	------	------

इस उदाहरण में 'बृक्ष' शब्द का अर्थ 'पेड़' है जिसे रेखांकित किया गया है।

१	ध्वनि	शब्द	संगीत	धनी	ताल	तरंग	१
२	विदेही	जिसके अंग दूटे हों	असुर	पिशाच	विरही	जो शरीर रहित हो	२
३	सहज	सरल	अच्छा	साफ	ठीक	समान	३
४	समिति	सम्मति	सहयोग	मेला	सभा	दल	४
५	परिवर्तन	आगे पीछे	आने वाला समय	अदल-बदल	चक्कर	परिभ्रमण	५
६	पुनीत	महान	निर्मल	पवित्र	पूज्य	शुभ	६
७	जस्था	गट्ठा	गोष्ठी	झण्ड	कक्षा	सभा	७
८	ज्योति	सूर्य	चमक	प्रकाश	दीपक	चाँदनी	८
९	प्रेत	आत्मा	राक्षस	शत्रु	भूत	भय	९
१०	हिंसा	बृणा	बध	ईर्षा	निन्दा	क्रोध	१०

११	सराहना	सहारा देना	उत्साह देना	धन्यवाद देना	प्रसन्न करना	प्रशंसा करना	११
१२	आयु	जन्म दिन	<u>उम्र</u>	युवक	काल	बढ़ाव	१२
१३	उत्पादन	<u>पैदा करना</u>	खोदना	जन्मना	खेती करना	बोना	१३
१४	उपयुक्त	<u>मान्य</u>	बुद्धिमान	उत्तीर्ण	योग्य	उन्नत	१४
१५	उपासना	उपवास	प्रसाद	<u>पूजा</u>	अभ्यास	सदाचरण	१५
१६	मुर्ध	चकित	<u>मोहित</u>	प्रशंसित	सम्मानित	मग्न	१६
१७	यत्न	सफलता	उपार्जन	<u>उपाय</u>	लाभ	जाँच	१७
१८	आवेदन	पुकार	<u>प्रार्थना</u>	पूछताछ	भक्ति	श्रुतुग्रह	१८
१९	प्रविष्ट	<u>केन्द्रित</u>	बैठा हुआ	निमन्त्रित	अन्तर्गत	अन्दर गया	१९
२०	निष्ठा	<u>श्रद्धा</u>	साधुता	ध्यान	नीति	आचार	२०
२१	शंका	भ्रम	<u>सन्देह</u>	भय	शोक	कष्ट	२१
२२	विस्तृत	विकसित	उठा हुआ	<u>फैला हुआ</u>	बिखरा हुआ	भरा हुआ	२२
२३	व्यथ	<u>खर्च</u>	हानि	खरीदना	धन	नाश	२३
२४	निहारना	ढूँढना	स्पर्श करना	दृष्टि फेरना	दिखलाना	<u>निरखना</u>	२४
२५	संगति	मित्रता	उन्नति	मिश्रित	<u>साथ</u>	सन्धि	२५
२६	हित	नीति	मित्रता	उपदेश	शिक्षा	<u>कल्याण</u>	२६
२७	सुवास	<u>गुलाब जल</u>	अच्छा घर	सुगन्ध	शोभा	अच्छा वेश	२७
२८	धरा	धैर्य	धारा	धारण	मिट्टी	<u>पृथ्वी</u>	२८
२९	तृण	घास	काँटा	भूसा	<u>तिनका</u>	थोड़ा	२९
३०	विद्यालय	आलय	कार्यालय	<u>शिक्षालय</u>	पुस्तकालय	विश्रामघर	३०

३१	कृषि	कारीगरी	मजदूरी	व्यापार	खेती	महाजनी	३१
३२	निर्मित	<u>बनाया</u> हुआ	दिया हुआ	पालित	जुड़ा हुआ	निकला हुआ	३२
३३	काक	मोर	बटेर	कबूतर	कोयल	<u>कीआ</u>	३३
३४	खड़ग	<u>तलवार</u>	ढाल	धनुष	तीर	बर्छी	३४
३५	कपि	फल	कीड़ा	<u>बन्दर</u>	कुत्ता	कबूतर	३५
३६	श्रनुसरण	<u>पीछे</u> चलना	श्रनुमति देना	स्वागत करना	समर्थन करना	माँगना	३६
३७	शोणित	<u>मांस</u>	हड्डी	दाँत	केश	रक्त	३७
३८	पथिक	साथी	सारथी	<u>यात्री</u>	भिन्नारी	मजदूर	३८
३९	कर्कट	कछवा	ततैया	मकड़ी	विच्छू	<u>केकड़ा</u>	३९
४०	विहग	पतंग	हिरन	साँप	पतंगा	पक्षी	४०
४१	समीर	<u>बादल</u>	आकाश	हवा	विजली	आग	४१
	अंबुद	<u>बादल</u>	सागर	सरोवर	नदी	वर्षा	४२
४३	मीन	कछवा	मेंढक	आँख	<u>जलहस्ति</u>	मछली	४३
४४	प्रकृति	इच्छा	दृश्य	स्वभाव	संसार	सरलता	४४
४५	श्रनुपलब्ध	श्रदृश्य	<u>अमूल्य</u>	श्रनुपस्थित	अप्राप्य	आरम्भ	४५
४६	उपचार	<u>चिकित्सा</u>	बीमारी	भलाई	सदाचार	लाभ	४६
४७	पताका	रस्सी	<u>भण्डा</u>	पतंग	पाल	पत्ती	४७
४८	समारोह	<u>समूह</u>	शोभा	<u>उत्सव</u>	प्रदर्शनी	सभा	४८
४९	शिला	ईट	मिट्टी	स्तम्भ	पर्वत	<u>पत्थर</u>	४९
५०	प्रसून	<u>पत्ती</u>	शाखा	फूल	फल	जड़	५०

